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# WMRC

ILLINOIS WASTE MANAGEMENT  
AND RESEARCH CENTER

ANNUAL REPORT 2002



STATE OF ILLINOIS

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## OUR MISSION

WMRC's mission is to conserve natural resources, reduce wastes, and increase economic viability by providing Illinois businesses, institutions, and citizens with information, research, innovative technologies, and technical assistance.

## OUR VALUES

We are advocates for responsible uses of natural resources through quality, innovative research; providing accurate, impartial information on environmental issues; and development and implementation of innovative pollution prevention technologies. To accomplish this we serve as change agents for businesses, government, educational institutions, and citizens of Illinois.

WMRC strives to be a leader in innovative pollution prevention technology diffusion, knowledge and integrity on environmental issues, providing educational opportunities on waste management issues, and developing effective partnerships. Our quality employees are empowered to be responsive to our customers, use a teamwork approach in a safe and stimulating work environment, and maintain their professionalism through training and recognition.

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## SOLUTIONS



That's what the Illinois Waste Management & Research Center is all about – solutions. Whether it is providing technical assistance to an industry, analyzing chemical contaminants, or answering an information request – it's all about solutions.

And at this point in history it is no longer just a matter of finding any solution...it must be a solution that reduces harm to the environment and is economically viable. History is full of shortsighted solutions that resolved one problem but created an even bigger one in the future.

The types of solutions that are needed today are sustainable solutions. Economic growth and scientific advancement do not need to be burdened with unrealistic demands. But they do need to be balanced with the needs of the environment. We are striving to develop sustainable solutions that will provide a future of exciting opportunities while preserving an environmental legacy for generations to come.

From the research we fund to the final manufacturing processes, we help improve, WMRC is always seeking a better way to do a job. To make the world a better place, those solutions have to be able to sustain growth, sustain the economy, sustain our natural resources and sustain the environment. It's not always easy to find these sustainable solutions...but that is what WMRC is pledged to do.

George Vander Velde,  
Director

## STRATEGIC PLANNING

It's impossible to help others plan for a sustainable future if you don't have a plan yourself. That is why WMRC operates under a five-year strategic plan. Each year an annual operating plan is prepared that includes specific objectives. Thirteen major objectives were set for the past fiscal year. Good progress was made on all of them, and many of these objectives are on-going projects.

Every quarter the staff at WMRC measures its performance through collection of data concerning our activities, inputs, outputs and outcomes. During the past year WMRC exceeded most performance targets.

### OBJECTIVES ACHIEVED LAST YEAR

- Initiate a technology diffusion initiative with the printed wiring board manufacturing sector in Illinois.
- Demonstrate innovative P2 technologies at electroplating and metal finishing facilities.
- Develop analytical methods to study arsenic problems in Illinois' drinking water supplies.
- Partner with researchers at the University of Illinois and other institutions to obtain federal funding to address water problems through the development of advanced technologies.
- Enhance IDNR's program to minimize waste in all facilities to serve as an example for other state agencies.
- Enhance public access to waste management and pollution prevention information, specialized collections, a clearinghouse and databases through the Internet.
- Host the 15<sup>th</sup> Annual Governor's Pollution Prevention Awards ceremony.

### NEW AND ON-GOING OBJECTIVES FOR THIS YEAR

- Demonstrate innovative P2 technologies at printed wiring board manufacturing facilities.
- Promote the diffusion of pollution prevention technologies throughout the metal finishing sector in Illinois.
- Develop new and refine existing analytical methods to address industrial process efficiency, waste reduction, and environmental contamination problems.
- Test the effectiveness of phytoremediation for cleaning up contamination in the Lake Calumet area.
- Develop beneficial uses for dredged Illinois River sediment including the restoration of brownfields
- Provide timely, professional responses to businesses and citizens on compliance and pollution prevention.
- Develop a pilot program in DuPage County to bring waste reduction and pollution prevention education to teachers in middle and high schools.
- Improve the efficiency of WMRC's administrative procedures and operations through greater use of computer technology.
- Host the 16<sup>th</sup> Annual Governor's Pollution Prevention Awards ceremony



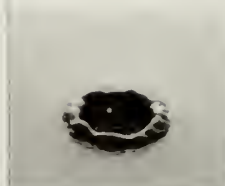
## CLEAN WATER IS VITAL TO LIFE

The demand for water pure enough to drink and to use for domestic and industrial processes will only increase in the coming years. Concern over the safety of water supplies throughout the world and in Illinois is rapidly increasing. In addition, all public water supply companies are required to upgrade their treatment technologies and security systems. This will be very costly. New technologies are needed that are more effective and less costly.

Over the past two years, WMRC has collaborated with researchers at the University of Illinois, Clark-Atlanta University, and Stanford University to request funding from the National Science Foundation (NSF) to address these issues. In May, NSF announced that the consortium, Science and Technology Center: Advanced Materials for Water Purification (AMWP), was selected for five years of funding at about \$4 million per year. This funding is renewable for another five years.

WMRC will play an integral role by conducting research on advanced methods for contaminant detection, testing the performance of new purification materials, and exchanging knowledge with industry. A key partner with WMRC in this effort is the Community Environmental Center of the Electric Power Research Institute located at Washington University in St. Louis, Missouri. WMRC will lead efforts to establish an industrial affiliates program.

Another mission of the AMWP Center is to develop diverse human resources to enhance scientific research. WMRC will be working with companies to establish scientist exchanges, and with the Illinois State Board of Education to implement educational programs targeted for groups that are under-represented in science and engineering.





## RESTORING THE ILLINOIS RIVER

Since the time of the first human inhabitants of what we now know as "Illinois," people have relied on the Illinois River for water, food, transportation and recreation. For centuries, the river has also provided crucial habitat for countless species. Over time, this vital artery has slowly clogged with sediment from run-off, human development, and industrial discharge with a significant reduction in species diversity. WMRC, through its Illinois River restoration efforts, is working hard to clean the sediment from the River and preserve this important waterway. The Illinois Rivers 2020 effort also involves a number of divisions of the Illinois Department of Natural Resources, the University of Illinois, the U.S. Army Corps of Engineers, and a variety of federal, state, and local organizations.

One project element is looking at how to remove sediment from the Illinois River in a cost effective and safe manner. Study teams are investigating dredging and transport techniques, the quality of the sediment and a variety of potential uses. The removed sediment could be used to restore wildlife habitats, and may prove suitable for use as landscaping soil, especially at sites near navigation channels.

Some Illinois River sediment has been used in research plots near Kilbourne. Here it was mixed with local soil and used to grow corn and soybeans. The University of Illinois Department of Natural Resources and Environmental Sciences is conducting the research on the viability and yield of these crops.

WMRC provided analytical laboratory support to several researchers on the sediment projects. WMRC staff examined metals content in soils supplemented with river sediment and vegetables grown in this soil. In most cases metal uptake was measurably greater in sediment-supplemented soils, but levels were not outside typical values reported elsewhere for vegetable plant tissues.

WMRC helped demonstrate a process where freshly excavated sediment can be transported via conveyor system. Using conventional dredging technology, the sediment would contain too much water to be transported on a conveyor. The results will help engineers determine how best to move large quantities of sediment from the river. Similar sediment removal and recycling projects are scheduled for other sites in the near future. This technology is less costly than conventional methods of transport, and saves dewatering time and costs.

Restoring the greatness of the Illinois River and other Illinois waterways will provide recreational and economic opportunities for Illinois citizens and help make the state more attractive to potential employers and their workers.



## ILLINOIS BROWNFIELD ALLIANCE

Rebirth and rejuvenation. Millions of acres of Illinois' land lies dormant waiting to be cleaned up and once again made productive. Thousands of manufacturing plants, retail stores and military bases have closed or relocated in the past 30 years. It is estimated that more than 10,000 of these Illinois sites have or are perceived to have contamination, contain asbestos, or have other environmental concerns. Some sites have been redeveloped, but many are abandoned or under-utilized. In a sustainable world, this land that has been known as "brownfields" can become sites of renewed development and natural habitats.

In the Spring of 2002, WMRC hosted a meeting with several other IDNR offices, Illinois EPA, the Department of Commerce and Community Affairs, Department of Transportation, Argonne National Laboratory, and several local government representatives. Out of this meeting, the Illinois Brownfields Alliance was formed. The Alliance will focus on creation of a public-private partnership to develop, implement, and enhance information management and redevelopment tools for brownfields.

### PROGRAM GOALS

- Provide land developers with consistent information and formatted brownfield site data
- Promote the exchange of ideas, methods, and results about brownfields
- Permit the analysis of trends and spatial relationships for and between brownfield sites
- Provide access to services and support to brownfield redevelopment
- Connect brownfield site holders with potential redevelopers
- Streamline access to economic incentive programs





## EDUCATIONAL OUTREACH



We all share a common home—the planet Earth (and on a smaller scale, the state of Illinois). Just as all members of a household care about and help to protect and maintain their home environment, so must all people care about and take responsibility for the condition of the environment. WMRC's efforts are focused on helping **all** citizens make our common home a safer, cleaner, and better place to live—for humans and all of our “roommates” on planet Earth.

Through various on-going activities and projects, WMRC is striving to educate all Illinois citizens from Pre-Kindergarten to senior citizens about the necessity of reducing waste, recycling and conserving energy. Through many educational programs, WMRC reached 74 schools, over 1,500 students and more than 250 teachers last year. On-going activities and projects include:

- The Great Lakes Regional Pollution Prevention Roundtable (GLRPPR) along with the Southwest Pollution Prevention Center developed a mercury comic book for school-age children that emphasizes the dangers of mercury and how it affects the environment and our health. To date, over 1500 copies of the comic book have been sent to various organizations, schools, and agencies in the Great Lakes region.
- WMRC participated in the Environmental Horizons conference at the University of Illinois at Urbana/Champaign. Staff presented a display of information about the Center, demonstrated the websites, highlighted major projects, and provided information on the environmental research projects funded by the Center. Scientists on our staff and scientists who have received funding from the Center also presented posters describing their research during the conference.
- WMRC assists the other Scientific Surveys with the coordination of an environmental science Quiz Bowl for students at Jefferson Middle School in Champaign. The Quiz Bowl provides a fun, motivating atmosphere

in which to teach students new concepts and help to reinforce environmental concepts presented in their school.

- The WMRC Laboratory staff provides educational opportunities for students from grade school through college. WMRC hosted several tours and demonstrations for chemistry undergraduate students from Parkland College.
- During a local day-care center's “Reduce, Reuse and Recycle” week, WMRC staff taught an interactive lesson on recycling and waste reduction and also read an age-appropriate book on taking care of the environment.
- WMRC is also working with the DuPage County Department of Public Works Solid Waste Division on science education curricula for middle and high school students. The program will work with schools throughout DuPage County on projects such as chemistry laboratory assessment, education about non-point source pollution prevention, groundwater modeling, “green” chemistry, and safe use of household chemicals.



## PNEAC

PRINTERS' NATIONAL ENVIRONMENTAL ASSISTANCE CENTER



Printing is one of the oldest forms of human communication. From hieroglyphics to laser printers, printing has evolved and kept pace with a changing world. With the changes in technology, the printing industry has also tried to keep current with processes and machinery that will reduce environmental impact.

The Printers' National Environmental Assistance Center (PNEAC) provides printers and technical assistance providers with regulatory and pollution prevention information. PNEAC has been operated by the Waste Management & Research Center for the past eight years. Experts from the Graphic Arts Technical Foundation, University of Wisconsin, Screenprinting and Graphic Imaging Association, Flexographic Technical Association, and Printing Industries of America collaborate with WMRC on this project.

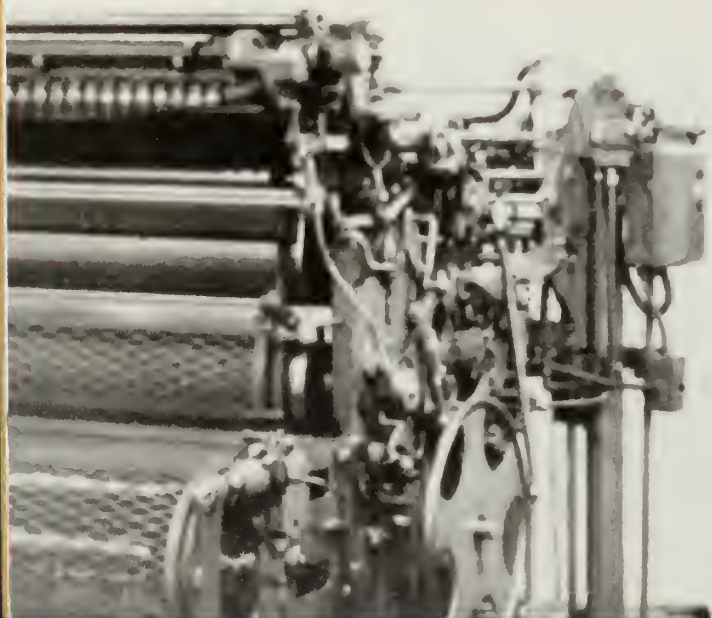
Each year PNEAC co-sponsors the annual Environmental Health and Safety Conference of the printing industry. Hundreds of attendees participate in training and advisory sessions. PNEAC has conducted over 20 training seminars that are customized for the audience and cover basic printing technologies, environmental regulations, and pollution prevention strategies. More than 2,000 people have attended these training sessions.

In the future PNEAC plans to develop a virtual print shop as an on-line training tool, to use advanced Internet tools to conduct virtual meetings for regulators and the industry, and develop additional on-line training programs. These tools will greatly increase participation, quality of information delivery, and access.

The printing industry employs nearly one million Americans and accounts for approximately 100 billion dollars in business each year. In Illinois there are about 2,600 printing companies, which range in size from the world's largest private printer to many that have less than five employees. Each year these printers do about 4.6 billion dollars in business, making Illinois one of the top five U.S. states for printing.

About 34,000 people visited the PNEAC web site each month during the past year. Information available at [www.pneac.org](http://www.pneac.org) includes:

- Over 120 peer-reviewed fact sheets and case studies
- Directory of 1,500+ vendors and suppliers
- National compliance information customized for the printing industry
- State-specific compliance information and contacts
- Federal and regional environmental initiatives
- Directory of national, regional and state contacts
- "Ask PNEAC" expert question and answer service
- Extensive archive of past questions and answers
- Archive of teleconference broadcasts
- Two heavily used listservs and a fax-back service to address technical and regulatory questions of interest to the printing industry.





# GLRPPR

## GREAT LAKES REGIONAL POLLUTION PREVENTION ROUNDTABLE



There is a wealth of information available on pollution prevention; the trouble is finding the best, most up-to-date information. The Great Lakes Regional Pollution Prevention Roundtable (GLRPPR) is a high quality resource for pollution prevention information, research and expertise. GLRPPR has assisted thousands of industries, organizations, small businesses and citizens.

WMRC is the coordinating agency for GLRPPR. The organization's members represent the U.S. states that border the Great Lakes and the province of Ontario, Canada.

The GLRPPR Information Clearinghouse was converted this year to an on-line collection of resources called the Sector Resources. The Sector Resources provide links to and references related to pollution prevention and environmental issues such as metal finishing, mercury, household hazardous waste and agriculture. Currently, there are 79 regional sector resources at [www.glrppr.org/hubs/](http://www.glrppr.org/hubs/).

Resource materials, called Topic Hubs, are also now available at the same web location. GLRPPR, in conjunction with its partners of the Pollution Prevention Resource Exchange (P2Rx), have developed web-based guides to pollution prevention overviews, processes, and resources specific to particular subjects. Each guide presents an overview of the subject and includes case studies, technical reports, fact sheets and links to experts. GLRPPR has developed Topic Hubs for Mercury in Health Care, Mercury in Schools, Lithographic Printing, and Regulatory Integration.

### GLRPPR SERVICES

- Assisting citizens, organizations, government agencies, businesses, and non-profit groups with specialized information searches. The service includes one hour of free literature or Internet searching on a pollution prevention (P2) related subject and a response within three working days.
- A quarterly newsletter, LINK, which contains articles, announcements, descriptions of pollution prevention activities and other environmental issues in the region. LINK is available electronically at [www.glrppr.org](http://www.glrppr.org).
- A Contacts Database that contains information on hundreds of people and programs in the Great Lakes region with expertise in various environmental issues.
- Two annual meetings to share information and foster program development. During the past fiscal year, the Winter Meeting held in Chicago focused on topics such as environmental security, mold in buildings and mercury switches in autos and appliances. The Summer meeting was held in Madison, WI and focused on state P2 programs.
- A calendar of pollution prevention and environmental-related events, conferences and trainings from around the region.
- There also are 17 listservs managed by WMRC staff. Among these are P2Tech-- a global listserv of over 500 technical assistance providers exchanging information and expertise—and five Department of Defense listservs for the region's technical assistance providers associated with the military.



## INFORMATION SERVICES PROGRAM



WMRC understands that the world moves at the speed of information. We strive to remain on the cutting edge of information management technology and constantly work to improve the quality of our information products. Our resources are focused on assisting business, government and the public make sound environmental and economic decisions.

### LIBRARY

The WMRC Library has two professional librarians who help clients locate information. The Library's print collection includes industry case studies and information on pollution practices, sustainable development and household hazardous waste. The Library's holdings include thousands of books, articles, maps, reports and periodicals.

The WMRC Library staff in 2002 developed a series of web-based reference guides covering current topics of interest to WMRC staff and clients. Subjects include: green building, chromated copper arsenate treated wood, state environmental awards programs, a librarian's environmental toolkit, lamp recycling and disposal, effective web searching, and information technology.

The WMRC Library staff responds to more than 600 information requests from WMRC clients each year. More than 450 books and videos, 13 serials, and 618 articles were added to the library's collection during the fiscal year. The Library staff also began adding records for web sites and online documents.

### CLEARINGHOUSE

The Clearinghouse consists of reports from research projects funded by the Center, pollution prevention fact sheets and brochures, and other environmental information from around the world. The Clearinghouse distributed 8,000 publications last year on topics ranging from household hazardous waste to mercury and pollution prevention in schools.

A major advancement of the Clearinghouse this past year was the digitization of all WMRC technical reports, fact sheets and research reports. These publications are now available on-line through the WMRC web site.

### GIS

WMRC has Geographic Information Systems (GIS) that provide individuals, companies and state agencies with information on the location of waste generators, waste management facilities, contaminated sites, and the quantities and components of hazardous materials. Reports include maps and related tables, using data selected from GIS and relational databases. Current GIS projects include:

#### ■ USER DIRECT INTERFACE

Users can now interactively search the landfills database online by site name, IEPA ID number, or ZIP Code. The Toxics Release Inventory (TRI) database for reporting year 1999 is also available at the WMRC website.

#### ■ DNR PROPERTY REVIEW

More than 90 reports were created for the DNR Office of Realty & Environmental Planning on parcels of land for possible acquisition. These reports help DNR avoid acquiring land parcels that may have environmental liabilities.

#### ■ THE CRITICAL TRENDS ASSESSMENT PROJECT (CTAP)

This project was designed to assess ecological conditions in Illinois. Derived from existing GIS datasets, CTAP reports consisted of maps, tables, and text, and were produced in cooperation with a number of DNR divisions.

#### ■ ARTICLE ILLUSTRATION

A map showing land cover in Macoupin County was published as part of John Marlin's article, *"The Native Bee Fauna of Carlinville, Ill. Revisited After 75 Years: A Case for Persistence in Conservation Ecology."*

#### ■ ILLINOIS RIVER MAPS

GIS also provided maps of the Illinois River that showed historical and current sediment deposition, geo-referenced aerial images, river depths and surrounding contours in 3D.

## GOVERNOR'S POLLUTION PREVENTION AWARDS

Since 1987, WMRC has been presenting the Governor's Pollution Prevention Awards to companies and organizations in Illinois that have demonstrated their commitment to environmental excellence through the practice of pollution prevention. The 2001 Governor's Pollution Prevention Award winners combined for an **annual** savings of more than \$11 million dollars in materials and disposal costs. The companies prevented nearly 70,000 tons of waste materials from being released into the environment, and saved more than 34 million gallons of water from being sent to treatment facilities.

WMRC also presented the first Innovate Illinois award to a company for developing and implementing a new technological innovation. The 2001 winner was Caterpillar Inc., Technical Services Division in Peoria. The innovation was a High Velocity Oxygen Fuel (HVOF) thermal spray process that has replaced chrome plating in several Caterpillar plants. The process eliminates use of a carcinogen and production of wastewater. Caterpillar received a \$1,000 scholarship funded by the Illinois Conservation foundation and donated it to the University of Illinois.



### AWARD WINNERS

SWENSON SPREADER COMPANY

NATIONAL MANUFACTURING COMPANY

NORCROSS SAFETY PRODUCTS, LLC

NOVEON, INC.

CATERPILLAR, INC.

TECHNICAL SERVICES DIVISION

CATERPILLAR, INC.



ABBOTT LABORATORIES

MIDWEST GENERATION EME, LLC

KESTER SOLDER COMPANY

INTERNATIONAL TRUCK AND ENGINE CORP.

HARDWOOD LINE MANUFACTURING COMPANY

ABLE ELECTROPOLISHING CO., INC.

COMMONWEALTH EDISON

C.J. SAPORITO PLATING COMPANY

AMERICAN NTN BEARING MANUFACTURING CORP.

HOMESHIELD

ISOTECH LABORATORIES, INC.



## TECHNICAL ASSISTANCE



Money, efficiency, and natural resources are key variables in the equation for a competitive, profitable business. They are also key variables in the equation for a more environmentally sustainable society. WMRC works with businesses, governments and citizens to improve their processes and practices; and helps to balance both the business and environmental equations. Adopting the practices and techniques recommended by our technical assistance providers can improve a company's bottom line. Providing sustainable solutions to ensure a cleaner and greener future is our bottom line.

Technical assistance projects undertaken this year include:

### CITY OF CHICAGO 2001 INDUSTRIAL REBUILD PROGRAM (CIRP), METAL CASTING INDUSTRY

Commonwealth Edison, the University of Illinois at Chicago and WMRC are working with the City of Chicago's Department of Environment Energy Management Group to perform comprehensive audits at metal casting facilities. The Metal Casting Assessment Team has performed energy and waste reduction assessments at sixteen facilities to date. This program is only for companies in the City of Chicago.

#### TECHNICAL ASSISTANCE SERVICES

- Pollution Prevention (P2)
- Energy Efficiency (E2)
- Water Purification and Use Reduction
- Environmental Management Systems
- Green Chemistry
- Compliance Assistance
- Testing and implementation of Alternative Technologies

### CITY OF CHICAGO INDUSTRIAL REBUILD PROGRAM, CHEMICAL INITIATIVE

The City of Chicago, Commonwealth Edison, University of Illinois at Chicago's Energy Research Center and WMRC are providing facility audits to Chicago Chemical Manufacturers to identify energy efficiency, process and waste improvement minimization opportunities. The team then recommends technical solutions to reduce energy, manufacturing and waste disposal costs. Finally, the team documents and prioritizes the opportunities based on project economics.

### CITY OF CHICAGO CORRIDOR INITIATIVE

The City of Chicago Department of Environment (DOE) has funded a coalition of organizations to provide Energy Efficiency (E2) and Pollution Prevention (P2) assistance to a specific geographic area within the city. Commonwealth Edison provides the E2 and WMRC provides the P2 assistance. These assessments result in process and system improvement recommendations on energy efficiency, the environment, and safety practices.

### ILLINOIS METAL CASTING PROJECT COALITION

The Department of Commerce and Community Affairs (DCCA) funded a coalition of organizations to provide energy, pollution prevention, environmental, and safety assistance to metal casting facilities throughout Illinois. The lead organization is the University of Illinois at Chicago's Energy Research Center with assistance from WMRC, the Illinois Environmental Protection Agency (IEPA), Commonwealth Edison, the North Business and Industrial Council (NORBIC), and the University of Northern Iowa. In 2001, the project provided on-site assessments to three metal casting facilities and continued implementation activities with six other metal casting facilities. The three assessments resulted in hundreds of process and system improvements,



recommendations on energy, environmental, safety, and information handling efficiencies.

#### METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO (MWRD)

WMRC led a Pollution Prevention (P2) Training Program for 12 MWRD Pollution Control Officers (PCO). The training focused on how to identify P2 opportunities, P2 technologies commonly used in the metal finishing industry, how to promote P2 to customers, and when to make referrals to technical assistance providers. As part of the training, WMRC developed a checklist to help the PCO identify P2 opportunities during inspections and make referrals to WMRC. The PCO's who attended this program have trained others on checklist use. The program has generated requests for P2 technical assistance from 25 companies. This is funded by the MWRD and USEPA under the Greater Chicago P2 Alliance.

#### CHICAGO FORD INDUSTRIAL PARK INITIATIVE

Ford, the City of Chicago, WMRC, government organizations, and interest groups are working towards building an industrial park that supports the manufacturing of Ford vehicles. WMRC, with support from the Chicago Department of Environment, is working with Ford suppliers to incorporate pollution prevention and industrial ecology at the design stage. Manufacturing will be based on the "just-in-time" concept with materials continuously flowing through the supplier's facility straight to the Ford plant. Ford envisions the final process involving parts coming from a supplier and being installed on a vehicle by the end of the day.

#### NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST) MANUFACTURING EXTENSION PARTNERSHIP

The successful partnership between the Illinois Manufacturing Extension Center (IMEC) and WMRC has provided Illinois companies with environmental and technical assistance since 1989. The partnership has provided over 200 Illinois manufacturers with a "full-service" environmental engineering component.

#### LABORATORY SUPPORT

WMRC Lab Staff analyzed hundreds of samples this year in support of research and client assistance efforts conducted by our Technical Assistance group. These analyses demonstrated problems in various industrial process or discharge waters, aided evaluation of and

decision-making on innovative technologies, and advanced knowledge of how various technologies function.

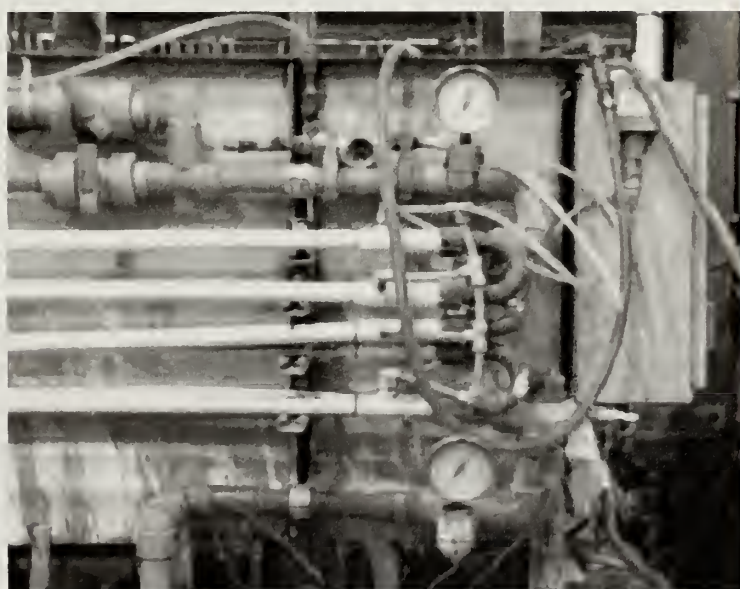
#### STRATEGIC GOALS PROGRAM (SGP)

The Strategic Goals Program is designed to help metal finishing companies achieve environmental and economic goals. Metal finishers and federal, state and local agencies work with one another to share resources and to make good environmental decisions without sacrificing the company's bottom-line. WMRC is working with several companies across Illinois to assist with these goals.

#### DEPARTMENT OF MILITARY AFFAIRS

WMRC's Mike Springman has been working with the Illinois Department of Military Affairs (DMA) performing Environmental Baseline Studies at sites that have maintenance facilities. A dozen studies have been completed, work is underway at seven other sites, and three more studies remain to be performed.

Springman also designed and assisted with the construction of an automated weapons cleaning facility at the DMA Unit Training Center in Marseilles, Illinois. Previously, individual soldiers spent up to three hours cleaning their assigned weapon after training or qualifying, which was a significant drain on manpower. This new automated system incorporates aqueous cleaners and ultrasonic agitation to clean the weapons. An entire rack of ten weapons can be cleaned in about eight minutes.



## ADOP<sup>2</sup>T

### ACCELERATED DIFFUSION OF POLLUTION PREVENTION TECHNOLOGIES

New technology and new ways of doing things can be intimidating. A good idea is only effective if it works in a real application. For new technology to be widely used, it must be tested, it must be available for review, and industry opinion leaders must adopt it. WMRC has created a model for technology diffusion that addresses all of these issues.

Accelerated Diffusion of Pollution Prevention Technologies (ADOP<sup>2</sup>T) first identifies innovative technology needs and then establishes demonstration sites in facilities in a chosen industrial sector. In exchange for participating, the facility receives WMRC assistance in setting up, testing, and evaluating a new technology for the duration of the pilot period. On-site technical assistance, on-site demonstrations, and testimonials from key industry leaders combine to show companies how they can have more efficient processes and a better fiscal bottom line. WMRC staff helps to document performance, overcome compatibility problems, and train employees on how to operate the new technology. The demonstration companies then mentor others so that the new technology can be widely accepted throughout the industry.

#### ADOP<sup>2</sup>T FOR METAL FINISHERS

Mentor companies participating in the ADOP<sup>2</sup>T for Metal Finishers program continue to assist with getting other companies involved in using new technologies and implementing pollution prevention (P2). Company representatives from the Chicago area were involved in launching the Rockford Strategic Goals Program. The Strategic Goals Program is designed to help metal finishers conserve water and energy, reduce hazardous emissions and wastes, and achieve greater utilization of metals.



Although metal finishers have been reluctant to implement new technology projects this past year due to the economic, WMRC has been successful in the implementation of new technologies, partially because of their favorable economic impacts. Environmental improvements (including P2 projects) are also on hold because the industry is waiting for USEPA to finalize the new Metal Products and Machinery regulations.

A new ADOP<sup>2</sup>T technology investigated this year was PRO-pHx acid bath extender. An initial WMRC report on the effectiveness of PRO-pHx has been written, but more work is planned in order to fully evaluate the pros and cons of the product. WMRC also issued its report on the *"Effect of Barrel Design on Dragout Rate."*

New investigations are currently underway in the area of energy reduction. Several companies have been helped with water reduction and environmental compliance, using previously adopted technologies and operating procedures.

#### ADOP<sup>2</sup>T FOR PRINTED WIRING BOARD (PWB)

The Chicago Metropolitan Water Reclamation District (MWRD) is working with WMRC to assist Printed Wiring Board (PWB) manufacturers that discharge copper into the Kirie water basin. WMRC is assisting these companies with projects that reduce their copper discharge through pollution prevention technologies.





## SUSTAINABLE PRACTICES IN GOVERNMENT

The State of Illinois and WMRC are leading the quest for a sustainable future through projects involving environmentally friendly purchasing, low environmental impact buildings, recycling and improving energy efficiency. As WMRC's Sustainable Practices Coordinator, Jeri Knaus coordinates recycling activities for the Department of Natural Resources' headquarters and field offices and participates on the Governor's Green Government Coordinating Council. George Vander Velde and Gary Miller of WMRC also serve on this council.

Governor George H. Ryan and The Illinois Green Government Council recognized WMRC and the Illinois Department of Natural Resources this past year for leadership and outstanding performance in preventing pollution and conserving natural resources in state government operations.

John Marlin and Gary Miller also served on the University of Illinois' Committee for a Sustainable Campus Environment. Topics examined included waste management, building design and landscape maintenance, materials procurement, and energy.

Some sustainable practice efforts include:

- WMRC played a key role in Illinois Governor George H. Ryan signing an Executive Order that commits the state to purchase "green power." Illinois also was the first state to commit to the U.S. EPA's Green Power Partnership Program.
- WMRC assisted Chicago Read Mental Health Facility on an energy efficient lighting project through the Governor's Green Government Council. A plan was developed in which the facility will borrow \$60,000 from the City of Chicago to pay for the lighting products. An estimated savings of over \$320,000 and a reduction of more than 4.6 million kWh are projected at the hospital over a four-year period. In addition, staff from WMRC will be collecting performance data that will be available as an educational tool to all state/public agencies to assist in similar projects.

- WMRC assisted the Glen Ellyn Park District in successfully securing an energy efficient lighting grant to replace lamps. The new lamps are expected to reduce energy use by over 145,000 kWh per year. The Park District expects to see an energy savings of almost \$40,000 over a four-year period.
- During the recent Illinois State Museum renovation project, WMRC staff helped to find markets for material to be recycled.
  - 4,240 pounds of metal/steel was taken to a recycling center and diverted from the waste stream. Steel railings were taken to property surplus for public sale.
  - More than 330 pounds of vinyl baseboard was picked up for recycling.
  - 182 four-foot and 74 eight-foot fluorescent lamps; 453 pounds of PCB containing ballasts; and 977 pounds of non-PCB containing ballasts were recycled on site.







## LABORATORY SERVICES

Pushing the limits of scientific investigation in pursuit of sustainable solutions is just one of our goals. The WMRC's Laboratory staff seek solutions to environmental problems posed by research scientists, businesses, and educators. During FY02, WMRC issued 189 laboratory data reports, and analyzed about 8,800 constituents in some 2,400 samples.

Projects that the WMRC Lab staff have undertaken include:

### ARSENIC SPECIATION

WMRC staff developed a procedure for measuring arsenic species in groundwater. The species, or form, of arsenic determines its toxicity and environmental fate. Development included solving numerous problems to allow accurate measurements of the arsenic species separately in a natural water (groundwater) matrix. The development of the capability made possible the "Arsenic in Mahomet Aquifer" project being conducted in collaboration with Illinois State Water Survey (SWS) scientists. The purpose of this project is to better understand the sources and behavior of arsenic in the aquifer, to ultimately benefit those people who consume its water. Research is also being conducted on better methods to remove arsenic from drinking water, making it safer for consumption.

### CALUMET PHYTOREMEDIATION PROJECT

The goal of this project, conducted by the United States Forest Service, is identifying methods to control contaminated groundwater migration from a highly contaminated former waste site to Indian Ridge Marsh

in the Calumet region of south Chicago. Indian Ridge Marsh is a focal point for the Chicago Department of Environment's efforts to revitalize natural areas in this region of the City, and make these areas generally available to the people of Chicago. The WMRC lab assisted in project and sampling design, sample collection, and analysis of a variety of samples including water, soil and tree tissue samples. WMRC staff also assisted in the analysis of the results and in the design for Phase II of the project, which is ongoing.

### NAVAL DENTAL RESEARCH INSTITUTE DENTAL WASTE PROJECT

Dental office wastewaters continue to be contaminated by mercury and other metals used in dentistry. Through this project at the Great Lakes Naval Training Center, WMRC staff investigated the removal of mercury, copper and silver from dental waste solutions by using the non-sulfide forming thiocarbamate compound, Trimercapto-s-triazine (TMT). TMT was shown to be very effective at precipitating mercury, copper and silver out of dental waste solutions. With very low TMT dosages, 95.9% of all three dissolved metals were removed from waste streams, putting the waste well below discharge limits. This could lead to a better method for removal of some contaminants from dental office wastewater to reduce impact on the environment.





### CHICAGO DRINKING WATER

WMRC analyzed several Chicago drinking water samples and provided phosphorus and aluminum measurements to help identify reasons for the occurrence of aluminum phosphate in Chicago's drinking water distribution system. The aluminum phosphate is a cause of turbidity in the water and is a maintenance concern in the distribution system. The study will continue through 2002.

### POLYCHLORINATED BIPHENYLS (PCBs) IN MOUSE TISSUES

WMRC provided the University of Illinois Veterinary Medicine School with analysis of PCBs in mouse ear tissues from animals exposed to PCBs in soil. The study is evaluating relationships between PCB exposure and skin cancer incidence, and is directly applicable to skin cancer in humans.

### ZINC PLATING

WMRC staff evaluated the relationship of conductivity to zinc concentrations in specific plating baths from Skild Plating in Chicago. The study determined that zinc concentration was linearly proportional to conductivity down to approximately 50 mg/L of Zn. The company was then able to estimate zinc concentration based upon simple conductivity measurements for a specific bath. This work allowed Skild Plating to save money on analytical costs and perform real-time monitoring of their baths, thereby increasing product quality, reducing water use and improving their bottom line.

### FUNGICIDE IN INDUSTRIAL COOLANTS

WMRC staff developed a method to measure a fungicide used in industrial coolants. To our knowledge this is the first analytical procedure devised for this difficult analysis. The analytical data will assist evaluation of methods to purify the coolants, hence reducing the discharge to the environment of this class of industrial solvents.

### LANDFILL LEACHATE

WMRC was contacted by Parsons Engineering, a firm involved in developing treatment solutions for landfill leachate emanating from Lowry Landfill SuperFund site in the Denver, Colorado area. The company was experiencing problems in the treatment efficiency of its process, and speculated that surfactants might be, in part, responsible for the problems. The WMRC laboratory was referred to them because of its unique capabilities in surfactant analysis. WMRC analyzed several batches of samples, thereby assisting Parsons' troubleshooting efforts.







## RESEARCH FUNDING

The best way to make sound decisions is through sound knowledge. Our Research Funding program supports cutting-edge research in environmental sciences, agricultural sciences, physical sciences, life sciences, and technology development. The results of the various research projects provide valuable information to Illinois' decisionmakers and citizens in their efforts to make sound environmental decisions. Sound decisions today help to ensure a sustainable future.

Each year WMRC is appropriated about \$400,000 from the Hazardous Waste Research Fund to sponsor studies.

WMRC is currently funding these research projects:

### COMPLETED RESEARCH PROJECTS

- Jeffrey M. Levengood and Tari A. Weicherding, Illinois Natural History Survey, created a database using GIS technology that enhances the ecological risk assessment process. The informative and expansive database provides environmental professionals access to comprehensive information regarding the presence of mammals, birds, amphibians, reptiles, fish, crayfish and aquatic insects in six counties south and west of Chicago.
- Stacey Thomas, Southeast Chicago Development Commission, conducted a study to determine whether recycling and materials exchange between companies in urban southeast Chicago is feasible. The project demonstrated the benefits and the need for coordination of materials and information exchange between industry, local organizations, and state and federal agencies.

- Michael J. Plewa, University of Illinois, began development of a rapid and accurate test to detect the presence of anti-cancer agents in corn ethanol by-product waste. There is increasing interest in adding ethanol to fuel, creating new demand for Illinois corn. Increased production of corn-based fuel will generate a large amount of by-product waste. Finding value in these wastes will improve the economics and reduce the volume disposed. This is part of a larger research project to identify uses for by-products of corn ethanol production.

### PROJECTS FUNDED IN 2002

- Richard Halbrook, Southern Illinois University, is exploring natural resource injury from oil and/or brine spills from small producers in southern Illinois. By evaluating changes in the biota and sediment chemistry of intermittent streams in southern Illinois, Halbrook will assess impact of past spills and document the rate of natural recovery.
- Richard Cahill and his associates at the Illinois State Geological Survey, will continue efforts to improve contaminant information on Illinois River sediments. The researchers will collect data on a large number of contaminants in sediments from 10 sites.
- Robert Darmody and F. William Simmons, UIUC, are also working on the value of Illinois River sediments. They are exploring the addition of dredged sediments to poor quality, sandy agricultural soils to determine if the high fertility and water holding characteristics of the sediments will enhance the productivity of these soils.



- Tom Holm and his associates at the Illinois State Water Survey are investigating the occurrence of arsenic and its distribution and chemical forms in the Mahomet Aquifer, one of the largest and most important aquifers in Illinois. This research should improve the knowledge base on what forms of arsenic are occurring in wells using the aquifer and provide some insights into more effective arsenic removal technologies for water treatment plants and home owners.
- Gerald Sims and Richard Larson, UIUC, are studying the potential environmental effects of antibiotics used in animal agriculture. Antibiotics are commonly used in livestock and animal confinement systems for prevention and treatment of disease as well as for growth promotion. Widespread use of agricultural antibiotics raises concerns about the development of antibiotic resistance in livestock disease vectors and in the environment, through release in wastes.
- Jeff Levensgood, Illinois Natural History Survey, is conducting a study to examine the health of a black-crowned night heron population in the Calumet region of south Chicago. The project is being done in collaboration with the City of Chicago Department of Environment and the US Fish and Wildlife Service. The project will determine if exposure to contaminants is adversely impacting the black-crowned night heron colony that nests in the region. The researchers will monitor the behavior and reproductive success at selected heron nests in the colony, and collect contaminant level data on fish captured at sites where herons are feeding. Information generated from this study should assist decision makers with pursuing restoration and remediation in the region.
- Schuyler Korban and Sangman Lee, UIUC, are developing genetically altered plants that offer increased efficiency in detoxifying soils contaminated with heavy metals. They will attempt to increase metal tolerance in Indian mustard and increase the ability of the plant to translocate metals into tissues. These plants could then be used to naturally remediate heavy-metal contaminated soils



#### PROJECTS ENDING IN FY03

- Thomas Bierma and Frank Waterstraat, Illinois State University are investigating more efficient industrial site management of metal working fluids.
- Rob Sanford and Mark Clark, UIUC, are evaluating the effect of metal working fluid on worker health and safety.
- Lutgarde Raskin and Kent Rausch, UIUC, are exploring the recovery of sulfur from corn processing industry wastes.
- James Economy, UIUC, is developing new materials to remove environmental contaminants from aqueous media.
- Stephen D. Ebbs, Southern Illinois University, is evaluating the uptake of metals from contaminated soils by garden vegetables.
- Amy A. Ando, UIUC, is gathering information on how other states assess costs for Natural Resources Damages, including the value given to natural resources and the services they provide.
- David J. Voegtlin, Illinois Natural History Survey, in a study jointly funded with The Chicago Wilderness Society, is doing a baseline survey of invertebrates at sites in the Calumet region.

## WMRC STAFF

(staff as of 7-1-02)



### ADMINISTRATIVE SERVICES

George Vander Velde, Director  
 Gary Miller, Assistant Director  
 John Marlin, Senior Scientist  
 Kate Day, Manager, HR & Finance

|            |                   |
|------------|-------------------|
| Judy Day   | Cindy Melchi      |
| Jeri Knaus | Margaret Morrison |
| Tenna Knox | Cheryl Van Ness   |

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Tim Lindsey, Manager  
 Raymond Ronda, Satellite Office Manager

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| Malcolm Boyle  | Joe Pickowitz       |
| Jerry Brown    | Kishore Rajagopalan |
| Georgene Frego | Todd Rusk           |
| Cliff Jahp     | Riyaz Shipchandler  |
| Doug Neidigh   | Mike Springman      |

### RESEARCH & LABORATORY SERVICES

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| Julie Hafermann | Luann Wiedenmann |
| Yakov Lazovsky  | Monte Wilcoxon   |
| Chris Rohl      |                  |

### INFORMATION SERVICES

Bob Iverson, Manager

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| Jini Cook      | Todd Schumacher |
| Blake Harvey   | Joy Scrogum     |
| Debra Jacobson | Prill Smiley    |

### DATA MANAGEMENT

Randy Wahlfeldt, Computing Administrator  
 Ed Delso



### IN MEMORIAL

The WMRC family was saddened during the past year by the sudden and untimely death of one of our fellow workers, Tracie Klecz. For more than six years, Tracie worked as our receptionist and in the finance department. She was the first voice and face of WMRC for many of our visitors and staff. We miss Tracie and mourn with her family.







WMRC M

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